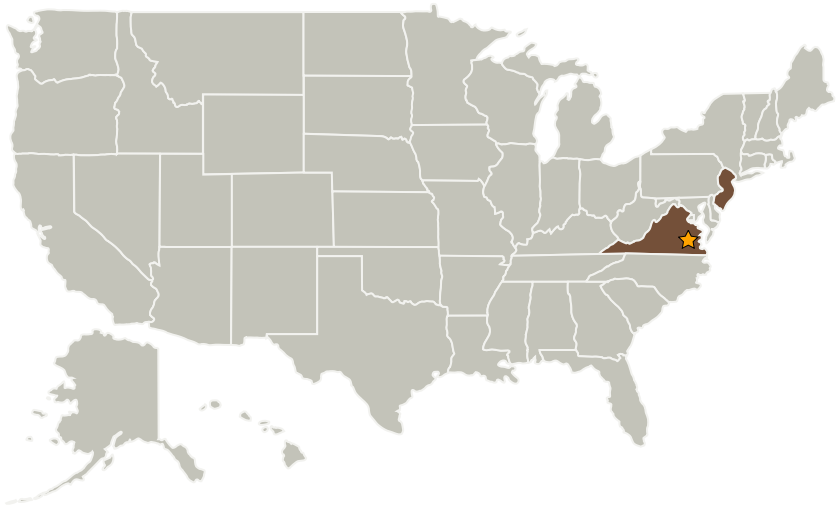
Time Reversal Acoustic Structural Health Monitoring Using Array of Embedded Sensors, Phase I

Completed Technology Project (2004 - 2005)

Project Introduction

Time Reversal Acoustic (TRA) structural health monitoring with an embedded sensor array represents a new approach to in-situ nondestructive evaluation of air-space systems. The suggested approach is based on a sufficient improvement of recently developed Electro-Mechanical Impedance method and will use a similar array of embedded sensors. The application of TRA principles will significantly improve the system?s ability to detect the presence of structural faults and localize damage due to directive focusing of the ultrasonic signals radiated by many sensors. Scanning of the focus will give the necessary information for tomographic mapping of damage and degradation. During Phase I, the principles of TRA system with embedded sensors for damage detection will be developed and feasibility test will be conducted on composite and metal parts with increasing levels of damage. The developed TRA software and hardware will form a basis for the prototype that will be built in Phase II.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Artann Laboratories, Inc.	Supporting Organization	Industry	Lamberville, New Jersey

Primary U.S. Work Locations	
New Jersey	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.2 Structures
    - TX12.2.3 Reliability and Sustainment